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ROYAL GARDENS, KEW.

BULLETIN

OF

MISCELLANEOUS INFORMATION.

No. 70.] OCTOBER. [1892.

CONTENTS.

CCLXVI.—Lao Tea.
CCLXVII.—Chinese Silkworm Gut.
CCLXVIII.—Mangrove Bark and Extract.
CCLXIX.—Burmese Black Rice.
CCLXX.—Mauritius Tea.
CCLXXI.—Potato Disease in Poona.
CCLXXII.—British North Borneo.
CCLXXIII.—Alloiya Tubers.
CCLXXIV.—Miscellaneous Notes.

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BULLETIN

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CCLXVI.—LAO TEA.

(*Camellia theifera*, Griff.)

Recently a singular method of using the leaves of what has since been proved to be the Assam tea plant of commerce (*Camellia theifera*) was brought before the Society of Arts by Mr. Ernest Mason Satow, C.M.G. Amongst the Laos, a people inhabiting a district of Siam, in the neighbourhood of Chiengimai, the tea leaves are not used for making an infusion as in other countries, but are prepared wholly for the purpose of chewing. The leaves are first steamed and then tied up in bundles and buried in the ground for a period of about 15 days. Leaves thus prepared, called locally "mieng," are said to keep for two years or more. The habit of chewing "mieng" is almost universal among the Laos, and to men engaged in hard work, such as poling or rowing, it is said to be almost indispensable. The result of an inquiry made by Kew in regard to the plant yielding "mieng" and the method of preparation is detailed in the following correspondence :—

ROYAL GARDENS, KEW, to FOREIGN OFFICE.

SIR, Royal Gardens, Kew, 8th February 1892.

I AM desired by Mr. Thiselton-Dyer to inform you that his attention has been called to an interesting paper on "The Laos States, Upper Siam," recently read before the Society of Arts by Mr. Ernest Mason Satow, C.M.G., late Minister Resident and Consul-General at Bangkok.

2. In the course of this paper, as shown in the extract enclosed, Mr. Satow drew attention to the use of "mieng" or Lao tea. It appears that the Laos do not drink the infusion of this tea, but prepare the leaf for chewing by burying it in pits. It is said to be one of their indispensable luxuries.

3. It is not clearly established that this Lao tea is identical with that obtained from the true tea plant. In any case the particular way in which it is used is certainly singular, and the subject deserves to be more fully investigated.

4. Mr. Thiselton-Dyer would therefore be glad to obtain through the kind offices of the Secretary of State specimens of the leaves and flowers

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of the plant yielding Lao tea; also a sample, about half a pound in weight, in a dry state, of the fermented article as prepared ready for chewing.

I have, &c.

Sir Villiers Lister, K.C.M.G., Foreign Office, S.W.

(Signed) D. MORRIS, Assistant Director.

[Enclosure.]

EXTRACT from PAPER on the LAOS STATES, UPPER SIAM, by E. M. SATOW, C.M.G. *Journal of the Society of Arts.* January 22nd, 1892, page 194.

"The path at first winds round the top of a pine-clad spur stretching towards Doi Suthĕp and then plunges down a declivity in a north-east direction, bringing us to the hamlet of Pong-yeng. Just at the bottom of the hill we passed a plantation of *mieng* or Lao tea. The natives call these plantations *pa-mieng* or tea-forest; if *pa* be rendered literally this term causing it to be generally supposed that the *mieng* grows wild. Laos tell you that it is found growing in commixture with other trees which are cut down, leaving the tea-tree to benefit by the additional air and sun. But this account seems doubtful. It is possible that the Laos of Chiengmai, when the country was resettled, found old tea-trees growing in this way, and cleared them from the jungle which enveloped them, but the arrangement of the trees is too regular to allow of our supposing that they were planted by the mere hand of nature. Many were 12 to 15 feet high, with stems two and a half to three inches in diameter, and they were evidently not pruned. Some were in bud or flower and others bore the half ripe berry. The leaf is longer and more pointed than that of the Japanese tea-plant and the foliage is less dense. But of its being a species of tea there can be no doubt whatever. The Laos do not drink the infusion, but prepare the leaf for chewing by burying it in pits, and it is one of their indispensable luxuries. You see a man put a lump of the fermented leaves in one cheek, which he leaves there while he proceeds to chew betel or smoke a cigarette, looking for all the world as if his face were distorted by the mumps."

FOREIGN OFFICE to ROYAL GARDENS, KEW.

SIR, Foreign Office, September 8th, 1892.

I AM directed by the Earl of Rosebery to transmit to you the enclosed copy of a despatch from Her Majesty's Minister in Siam respecting the specimens of Lao tea which were asked for in your letter of the 8th of February last.

The specimens have been despatched from Singapore, and will be forwarded to you as soon as they arrive at this Office.

I am, &c.

(Signed) T. H. SANDERSON.

W. T. Thiselton-Dyer, Esq., C.M.G.
Kew Gardens.

[Enclosure.]

MY LORD British Legation, Bangkok, 21st July 1892.

WITH reference to your Lordship's despatch, No. 3, of the 11th of February last, stating that the Director of the Royal Gardens, Kew,

was anxious to procure specimens of "mieng" or Lao tea, I have the honour to state that specimens of the plant and its flowers, together with a quantity of the fermented article ready for chewing, obtained by Mr. Stringer, Acting Vice-Consul at Chiengmai, have been forwarded by this mail to the Foreign Office.

The specimens of the plant have been sent by the agents of the Ocean Steamship Company, Singapore, who will transmit the bill of lading to London and the packet of the fermented article and flowers by parcel post from Bangkok.

I enclose herewith a report by Mr. Stringer on the culture and use of Lao tea.

I have, &c.
(Signed) HENRY M. JONES.

The Marquis of Salisbury, K.G.

REPORT on the CULTURE and USE of "MIENG" or LAO TEA

On May 3rd, 1892, I paid a visit to "Pa mieng" (literally tea forest) or place where the Lao tea plant grows, and the leaves are prepared for chewing, in order that I might, in accordance with instructions received from H.M. Minister-Resident at Bangkok, obtain specimens of the tea and report on the culture and use of it. The forest visited was near a hamlet of about 20 houses, called Kong Hë, distant about 25 miles from Chiengmai and about five miles from Pong Yeng, the village near which Mr. Satow met with the tea plant as mentioned in his paper lately read before the Society of Arts. This forest is a much smaller one than some of the others near Chiengmai, but has the advantage of being much nearer to the city. It is situated on the north-western slope of the mountain range near Chiengmai, at an altitude of about 2,000 feet.

The tea trees were growing in abundance near the village, and close together. It is not correct to say, as the Laos sometimes do, that all the trees are self sown, and all that is done is to cut down the surrounding jungle, leaving the tea tree free to benefit by the air and sun, as I was informed by the tea pickers here that new trees were obtained by planting the seed. When the tree grows to such a height that the leaves of the top branches are bent down, the larger branches are cut off at the stem, and the tree produces new branches.

There are four seasons for picking the leaves in a year, the first in the eighth Lao month (April–May), the second in the ninth month (May–June), the third in the twelfth month (September–October), and the fourth in the second month (November–December). The picking goes on for about a month in the first two seasons, and for a shorter time in the third and fourth. The first two pickings produce the largest crop of leaves, the third produces less than these, and the fourth less than the third. The leaves of the first picking are considered the best.

In gathering the leaves only the young ones are taken, and the upper portion of the leaf is nipped off with the fingers, about a quarter of the leaf being left attached to the tree. If the whole leaf is picked, the young branches from which the leaves are picked off die. Each handful of leaves as it is gathered is tied tightly together. The picking takes place in the early morning, and about mid-day the leaves are steamed. This process takes place in a shed built for the purpose, and provided with one or more furnaces. The furnace consists of a hole in the ground, and over this is placed an earthen pot or chatty containing water. The "mieng," tied in small bundles or handfuls, is placed in a wooden

cylinder, about 24 inches in height and 15 inches in diameter. At the bottom of the cylinder is a network of small strips of bamboo. This cylinder is suspended over the earthen pot, and round the edge of the pot is placed a wet cloth, so that all the steam may pass up through the cylinder. When the "mieng" has been thoroughly steamed, which is ascertained by its having sunk down to a certain point in the cylinder, it is left to cool and then taken out and retied, as the bundles have decreased in size, and it is then ready for use. If, however, the "mieng" is to be kept for any length of time, it is placed in small pits dug in the ground and lined with large leaves, and it is then well trodden down to press out as much of the liquor as possible. It is then covered up with leaves and large stones are placed on the top, and it is left thus buried for about 15 days. I am informed that "mieng" which has been pressed and buried in this way will keep for two years. If the "mieng" is required for immediate consumption it is not necessary to bury it, but it is packed in large baskets, and large stones are placed on it to press out the liquor. The liquor which is left in the pot after steaming the "mieng," and which is of a dark reddish-brown colour, is used as an article of food by the Laos and Siamese. The habit of chewing "mieng" is almost universal among the Laos, and the men engaged in hard work, such as poling or rowing boats, a quid of "mieng" seems to be almost indispensable. It appears to have the same effect upon the nerves as that of drinking tea.

The price of the prepared article at the village which I visited was one rupee (1*s.* 3*d.*) for 12 packages, a package containing 10 bundles or handfuls. In Chiengmai from 7 to 10 packages are sold for one rupee. A bamboo joint containing three bundles of the prepared mieng is forwarded with this report, also some dried leaves and flowers of the shrub and some young plants. At the time of my visit to the tea garden flowers were scarce, as the shrub flowers later in the year.

(Signed) C. E. W. STRINGER.

The specimens forwarded to the Foreign Office were duly received at Kew, and they are deposited in the Museums of Economic Botany. The specimens of flowers and leaves were found to be identical with the indigenous tea of Assam (*Camellia theifera*, Griff.). The young plants, however, did not reach Kew alive. This, under the circumstances, was not a matter of much moment, as both the Assam and China tea plants of commerce are well represented in the Kew collections.

CCLXVII.—CHINESE SILKWORM GUT.

In the Foreign Office Report on the trade of Kiungchow [F. O. Annual Series 1891, No. 898] the following account is given of a wild silk found in the neighbourhood of Kiungchow, and utilised locally for fishing lines:—

"A very strong silk is made from the grub called the 'celestial silkworm' ('t'yn ts'am'), or, locally, 'paddy insect' ('din t'ang). This grub is found on a sort of maple, the fêng tree, or *Liquidambar formosana*, Hance. When the insect is full grown it is thrown into boiling vinegar, on which the 'head' of the gut or 'silk' appears; this is sharply torn out with both hands drawn apart, and is as long as the

space between them, say five feet; it is so strong that one single thread of it is sufficient to make a line with which to catch the smaller kinds of fish."

The same subject is referred to again in the Foreign Office Report on the trade of Kiungchow for the current year [F. O. Annual Series, 1892, No. 1026]:—

"I enclose with this report, for transmission to Kew, a specimen of the very tough 'wild silk' of my last report, locally used for fish lines. The 'taotai' of Hainan informs me that, according to popular report, the insect is produced upon the 'fêng' tree, or *Liquidambar formosana*, Hance.

"In Canton it is called 'yü-sz,' or 'fish silk,' also 'yü-sz t'an,' or 'fish silk head.' In Hoihow it is called 'hang-ti' (ch'ung-sz), or 'insect silk,' and it is said to cost 60*l.* the 133⅓ lbs., or 1,000*l.* the ton. Another account says that the insect which produces this tough silk is found everywhere, but is seen at its best in Hainan, on the summits of isolated mountains in the 'Lai-mui' (Ling-mên) neighbourhood. In the early summer (3rd and 4th moons) of each year the insect feeds on the leaves of the 'chang' (or ? camphor) tree, and dies when the leaves fall off. The male produces a single and the female a double thread of silk, that produced by the female being, however, of inferior quality. Specimens of the insect were promised me for the month of April, but I regret to say that I shall not be in a position to welcome their arrival."

The specimens mentioned in the latter extract were received from Mr. Acting-Consul Parker, and are now in the Kew Museum. The production of silk-gut in China is a subject that was very prominently brought forward by Mr. Consul Swinhoe nearly a quarter of a century ago. The following extracts are taken from the correspondence which took place at that time, to supplement the information now given by Mr. Parker:—

FOREIGN OFFICE to ROYAL GARDENS, KEW.

SIR, Foreign Office, May 7, 1867.

I AM directed by Lord Stanley to transmit to you a copy of a despatch from Her Majesty's Consul at Amoy, containing information in regard to a silk-producing caterpillar which is found in that part of China, and forwarding specimens of silkworm gut drawn from this caterpillar by the natives.

I am, &c.
(Signed) E. HAMMOND.

Dr. Hooker,
Royal Gardens, Kew.

H.B.M. CONSUL, Amoy, to FOREIGN OFFICE.

MY LORD, British Consulate, Amoy, March 11th, 1867.

COMMERCIAL men may like to learn that in the south of China a silk-producing caterpillar is found on the leaves of a forest tree. I have the honour to enclose some pieces of silkworm gut drawn from this caterpillar by the natives of this district. This appears to be the sole use to which the creature is here applied. For this purpose it is not reared in captivity, but captured on its descending from the tree to spin its cocoon in the earth previous to its transforming into the chrysalid state. The matured worms are steeped in vinegar for a day and then drawn out into gut, which is used for fishing lines and for various economical and ornamental purposes.

I have not been able yet to procure the insect so as to ascertain whether it be known or not to naturalists, but as soon as the season comes round I have no doubt that I shall be able to do so. The curious fact regarding it is that it subsists on the leaves of a Liquidambar, a tree that flourishes from Canton to Nanking and in Formosa, and of which a near ally, *L. styraciflua*, thrives in North America. So that if eventually it be found worth while to cultivate the insect for the sake of its silk, I should think it would be no great difficulty to educate it to feed upon the leaves of that American forest tree.

The late Mr. Oldham, travelling botanist for Kew Gardens, and myself in 1864 first procured this tree at Tamsuy, Formosa. We sent specimens of it to Dr. H. F. Hance, H.M. Vice-Consul at Whampoa, who is the botanical authority in China, and he described it as a new species of Liquidambar, and named it *L. formosana*. It formed one of the most conspicuous trees in the mountain forests of Formosa. On my return to Amoy last year I found it abundant in the woods of the interior here, and wrote and informed Dr. Hance of the fact. Dr. Hance replied that he had also seen it common about 120 miles above Canton, and that it was there called the "Bastard Chestnut," and that "a caterpillar feeds on it, the chrysalis of which yields a coarse silk."

* * * * * *

The mention of the silkworm incited me to make every inquiry about the tree at Amoy, and as I have above stated I find that such a worm does also occur on the tree here, but that it is only used for silkworm gut.

The *Liquidambar formosana*, Hance says, is known to the Chinese as the Fung (or Feng) tree. The Chinese Gazetteer of Formosa gives the name as of a tree occurring in Formosa but nothing more. The Chinese standard Dictionary of Kanghe gives a peculiarly Chinese account of it, but makes no allusion to the caterpillar.

* * * * * *

I learn from the natives that the bark is fragrant when charred, and that a decoction of the leaves is used as a stomachic. A resinous sap is tapped from the tree which is sometimes used in lamps in place of oil.

* * * * * *

As so much interest is now taken in silk-producing insects, no further excuse may be needed for my boldness in communicating the information for your Lordship's consideration. I trust in due course of time to be able to lay before you some particulars about the worm itself.

I have, &c.
(Signed) ROBERT SWINHOE,
H.B.M. Consul at Amoy.

The Lord Stanley.

H.B.M. CONSUL, Amoy, to FOREIGN OFFICE.

MY LORD, British Consulate, Amoy, 10th April 1867.

REFERRING to my despatch of 11th March 1867, I have now the honour to forward a few cocoons of the silk-producing worm of the *Liquidambar formosana*, Hance. I have not yet seen the moth, but judging from the cocoon, it is pretty certain that we have here no Bombyx. The cocoons are worked by the insect on the bark of the tree, and are so hard, coarse, and thin, that in the first place it can be no easy matter to

unravel the silk, in the second, when unravelled, the silk could only be converted into very coarse textures, and in the third place, there is apparently so little of the silk that it is doubtful whether it would ever be worth while to attempt to acclimatise and domesticate the insect in the west. I have already informed your Lordship that in this district the Chinese use this worm only for the purpose of making silkworm gut, but that I had been informed that in the Canton province, the silk, such as it is, is woven. Only lately Dr. H. F. Hance, H.B.M. Vice-Consul at Whampoa, wrote to tell me that the cocoons are sent from the Canton district to Chinchan, bordering on Fokien, and there manufactured; I have not, however, succeeded in procuring a sample of this manufacture. I have myself no great hopes of the usefulness of this cocoon among European cultivators, I, nevertheless, take the liberty to forward the few specimens that I have been able to acquire that their value may be tested by qualified persons. Two or three of the enclosed cocoons contain live pupæ.

In conclusion, I may remark that the true silkworm is only reared here in small quantities, and more as an amusement for Chinese families than for commercial purposes.

I have, &c.

The Lord Stanley. (Signed) R. SWINHOE.

P.S.—I am forwarding to the Royal Gardens, Kew, a few live bushes of the *Liquidambar formosana.*

(Signed) R. SWINHOE.

The specimens of gut sent by Mr. Swinhoe were submitted by Sir Joseph Hooker to the late Mr. Daniel Hanbury, F.R.S., and his opinion upon them was as follows :—

"Silkworm gut is manufactured in Spain by a process which is briefly and clearly described in Ure's *Dictionary of Arts and Manufactures.* The process described by Mr. Swinhoe is essentially the same. The sample which he has sent is, however, as I am informed on good authority, not first rate, yet not so bad as to be unsaleable in the market here. *Good* silkworm gut is evenly round like wire, silky, bright, and colourless. The *thickest* and *longest* is most in request, and such quality is scarce. *Fine* is also in demand.

"The article is usually put up in little bundles of 100 threads each, and these again in tens."

The article in Ure's *Dictionary of Arts and Manufactures and Mines* mentioned by Mr. Hanbury is found in Vol. II., p. 619. Silkworm gut for angling is made as follows :

"Select a number of the best and largest silkworms, just when they are beginning to spin, which is known by their refusing to eat, and having a fine silk thread hanging from their mouths. Immerse them in strong vinegar, and cover them closely for 12 hours, if the weather be warm, but two or three hours longer, if it be cool. When taken out, and pulled asunder, two transparent guts will be observed, of a yellow green colour, as thick as a small straw, bent double. The rest of the entrails resembles boiled spinach, and therefore can occasion no mistake as to the silk gut. If this be soft, or break upon stretching it, it is a proof that the worm has not been long enough under the influence of the vinegar. When the gut is fit to draw out, the one end of it is to be dipped into the vinegar, and the other end is to be stretched gently to the proper length. When thus drawn out, it must be kept extended

on a thin piece of board, by putting its extremities into slits in the end of the wood, or fastening them to pins, and then exposed in the sun to dry. Thus genuine silk gut is made in Spain. From the manner in which it is dried the ends are always more or less compressed or attenuated."

In a further report, dated 23rd July 1867, Mr. Swinhoe communicated to the Foreign Office the following notes on the Chinese Liquidambar Silkworm :—

"Near the end of June small boys are set to watch under the trees for the worms to descend, lowering themselves on their own threads. They do not come down until they are ready to spin. As soon as a worm descends it is at once caught and broken, and the silk-gut there and then extracted, steeped in vinegar, washed and drawn out. The small boys are always provided with vinegar and water when in the capture, as the operation brooks of no delay. If the worms are kept at all the gut is useless and will not draw. Each gut, if properly managed, will draw out to 20 or 30 feet. The gut is dried in a shady place, and is then rolled up and considered ready for use."

The specimens so far received of this silkworm consist of cocoons only, and it has been impossible to determine it from these alone. It may possibly be *Attacus Pernyi*, but the imago or mature insect is necessary to settle the point. The cocoons sent by Mr. Swinhoe are attached to the bark of a tree, and are of a dull grey colour. The upper narrower end forms a natural orifice for the exit of the moth, and hence the cocoons are not closed like those of the ordinary silkworm. It is possible that the silk from these open Chinese cocoons, as anticipated by Mr. Swinhoe, may not be of any special value. Some fabrics, have, however, been made from the silk, and specimens were forwarded by Mr. Swinhoe. These unfortunately were required by the Secretary of State to be returned to the Foreign Office in 1868 for the information of the Board of Trade. Mr. Swinhoe stated that the fabric to which he refers as "'crape pongee' could not meet the demand, and "the stuff eventually got out of fashion, though many still wear it [in "1867] at Chaochowfoo." He adds, "it is mostly spun for home use and "for trade on special demand."

In a letter addressed to Kew, dated Foochow, May 31, 1892, Mr. F. Cave Thomas evidently refers to the silk-gut from the same insect as follows :—

"Enclosed I take the liberty to send you a specimen of a product yielded in this part of China by a worm (somewhat akin to a silkworm), and in considerable demand for the purpose of making fish lines. Would it be asking too much of you to give me your views upon the probability of introducing this commodity into use in England for a similar purpose . . .

"It seems so strong and serviceable that there should be an opening in England if some one would take the matter up.

"I beg to thank you for any assistance you can afford me. It costs about 6*s*. 6*d*. to 7*s*. per pound."

Messrs. Charles Farlow & Co., Fishing Tackle Manufacturers, 191, Strand, to whom Mr. Thomas' specimens were referred, state that the "gut" they use is from the ordinary silkworm, and it can only be obtained (exactly as they wish it) from Spain. The Chinese gut they describe as "very similar to what we have seen many years ago, perhaps "not quite so brittle. It could not be used for fishing purposes, and "we do not know for what purpose it could be used."

In a *Handbook of British Commerce* by Mr. P. L. Simmonds, F.L.S., 1892, p. 153, silkworm gut is described "as an animal fibre used for "making leaders for fishing lines, imported from China obtained by "steeping the silk caterpillar in vinegar. One hundred and fifty, "hundredweights are sometimes shipped to Europe from one port, "Kiungchow."

CCLXVIII.—MANGROVE BARK AND EXTRACT.

(*Rhizophora Mangle*, L.)

The bark of the common Mangrove tree, which constitutes the chief arboreal element in the mangrove groves along the low coasts of the western tropics, is well known to contain an abundance of tannin. It is often used locally for tanning leather, and occasionally it is exported to this country. Some shipments of dried mangrove bark made from Trinidad last year were said to realise about 15*l*. to 18*l*. per ton. Since that time, however, the abundance of tanning materials in the market has caused a considerable fall in prices, and, as will be shown later, mangrove bark just now is practically unsaleable. In these shipments from Trinidad the bark was dried and broken in small pieces and shipped in gunny bags. A report upon a sample of Trinidad mangrove bark, communicated to Kew by Dr. Chittenden, Secretary of the Central Agricultural Board, is here reproduced:—

Victoria Chambers, South Parade, Leeds,
17th March 1890.

We have examined a sample of bark received from Messrs. A. L. Young & Co., Trinidad, on the 11th instant. The sample was broken up, and contained a considerable quantity of dust. It was very readily extracted with hot water, and gave an infusion of a light reddish-brown. An analysis gave the following results:—

Total extract - - - -		33·04	per cent.
Tannin, by hide powder -	25·10		"
Other matters - -	7·94		"
Insoluble - - - -		52·85	"
Moisture - - - -		14·11	"

On boiling with dilute acid the tannin was almost entirely converted into an insoluble "red" (phlobaphene). The solution yielded only a trace of gallic acid. Heating the tannin to 200 deg. C. had the same effect.

The infusion of the bark gave the following reactions:—

With ferric chloride, dirty brown colour; on adding ammonia, dark chocolate-brown precipitate. With tartar emetic, no precipitate; on adding ammonia chloride, light coloured precipitate. With cupric sulphate, no precipitate; on adding ammonia, reddish precipitate. With lead nitrate, light coloured precipitate. With lime water, reddish-brown precipitate. With strong sulphuric acid, crimson colour. With bromine water, yellow precipitate.

The tannin is a catechol tannin, and resembles mimosa bark to some extent, but is not identical therewith.

It differs in its reaction from the general known tannins, and *its effect in tanning can only be found by experience.*

The bark contains a considerable quantity of tannin, and we are of opinion will prove a valuable addition to our list of tanning materials.

(Signed) HUNT AND MACKAY.

In order to lessen the bulk and the freight charges on the crude mangrove bark, an effort has been made to extract the tannin from it locally, and forward the latter, in the form of a hard paste or cutch, to this country. Various experiments have been made from time to time in this direction. The latest of these experiments was tried at Jamaica, and the result, though unsatisfactory at the moment, may usefully be placed on record for the guidance of those who may be interested in the subject in other colonies.

DIRECTOR OF PUBLIC GARDENS AND PLANTATIONS, JAMAICA, to ROYAL GARDENS, KEW.

DEAR DYER, Kingston, Jamaica, 21st November 1890.

I SEND by same post a block of concentrated juice of the mangrove (*Rhizophora*) bark. The bark is used here extensively for tanning, and it occurs to me that the tannin extracted in this form might be of considerable commercial value. The stir about the exhibition is bringing forward many experiments which otherwise might not be noticed. I should be very glad if you could get an opinion for me as to the commercial value of the mangrove juice.

Yours, &c.

The Director, Royal Gardens, Kew. (Signed) W. FAWCETT.

The Right Hon. W. L. JACKSON, M.P., to ROYAL GARDENS, KEW.

Treasury Chambers, Whitehall, S.W.,

DEAR MR. THISELTON-DYER, 7th March 1891.

I MUST apologise to you for not sending earlier the analysis obtained of the sample of extract which you forwarded to me. I now beg to enclose it.

Following our conversation on the subject, I think the most practical way of testing the commercial value of the extract would be to obtain a trial by several firms. If your friends in Jamaica will send a quantity, say 20 cwt. of it, I will endeavour to obtain the practical opinions of several of the tanners in this country, and I shall be glad to protect the interests of your friends by insuring to them the full commercial value. If your friends decide to adopt this course, I think the best plan would be to consign it to Messrs. Dalton and Young, Brokers, of 29, Mincing Lane, London, E.C. This firm probably does the largest business in gambier of any firm in this country, and are thoroughly responsible and respectable people, with whom I have done business a great many years.

If I can be of any further assistance pray command me.

Yours, &c.

(Signed) W. L. JACKSON.

W. T. Thiselton-Dyer, Esq., C.M.G., F.R.S.,
Royal Gardens, Kew.

[Enclosure.]

Victoria Chambers, South Parade, Leeds,
8th January 1891.

The sample of extract received from the Right Hon. W. L. Jackson, M.P., Buslingthorp, yesterday, contained :—

Total extract - - - -		82·00	per cent.
Tannin, by hide powder -	58·30		"
Other matters - -	23·70		"
Insoluble - - - -		1·95	"
Moisture - - - -		16·05	"
		100·00	

According to the analyses done by Mr. Hunt at Buslingthorp, "bale" gambier contains from 30 to 35 per cent., and "cube" gambier from 45 to 50 per cent. tannin. As gambier gives a different tannage to other materials, a comparison of the amount of tannin in gambier with that in other extracts does not represent comparative values.

(Signed) HUNT AND MACKAY.

EXTRACT from Article on the Raetown Tannery in a Supplement to *Gall's Weekly News Letter*, Jamaica, June 13, 1891.

"The liquor may be made in various ways. In England, for instance, they use oak bark, but in Jamaica the leaves of the divi divi and the roots of the mangrove tree are mixed and used, and this latter tan pickle is acknowledged to be superior to any other kind. The roots and leaves used in the Raetown tannery are brought from the Palisadoes by the boat load. Before being steeped they are crushed in an old fashioned mill, of which one may get an idea by revolving a penny on its edge in a saucer. The stone used is an unusually large one and two more like it lie half buried in corners of the building. The proportion in which the leaves and roots are mixed is of course not for everyone to know. Every business has its secrets and the old foreman of the tannery has his like the rest."

COLONIAL SECRETARY, JAMAICA, to DIRECTOR OF PUBLIC GARDENS AND PLANTATIONS.

SIR, 21st June 1892.

WITH reference to your memorandum of the 9th February last, and the letter to you from this office, No. $\frac{977}{1336}$, of the 18th idem, I am desired by the Governor to inquire whether any steps have been taken by you in the direction of placing the supply of concentrated mangrove extract, therein referred to, on the home market, in accordance with his Excellency's desire, which it is understood was communicated to you by the Secretary of the Exhibition Commissioners.

I have, &c.

(Signed) NEALE PORTER,
Colonial Secretary.

W. Fawcett, Esq., F.L.S.

DIRECTOR OF PUBLIC GARDENS AND PLANTATIONS, JAMAICA, to the COLONIAL SECRETARY.

SIR, 24th June 1892.

IN reply to your letter, No. $\frac{5551}{22761}$, dated the 21st instant, I have the honour to inform you that the supply of concentrated mangrove extract referred to was shipped in the month of April, consigned to Messrs. Dalton and Young, Brokers, of Mincing Lane, London, who have undertaken the charge of it with a view to testing its commercial value.

The Right Hon. W. L. Jackson, now Chief Secretary for Ireland, has kindly promised to obtain the opinions of experienced persons on the extract, and the authorities of the Royal Gardens, Kew, have also interested themselves in the matter.

I have, &c.
(Signed) W. FAWCETT.

ROYAL GARDENS, KEW, to MESSRS. DALTON AND YOUNG, 29, Mincing Lane, E.C.

GENTLEMEN, Royal Gardens, Kew, 3rd August 1892.

WITH reference to a supply of concentrated mangrove extract consigned to you in April last by the Director of Public Gardens and Plantations, Jamaica, for a report on its commercial value, Mr. Thiselton-Dyer would be glad to be informed whether this extract possesses a market value of any importance, and if it is probable that there will be a demand for it in this country.

I have, &c.
(Signed) D. MORRIS.

MESSRS. DALTON AND YOUNG to ROYAL GARDENS, KEW.

29, Mincing Lane, London,
SIR, 6th August 1892.

IN reply to your letter of the 3rd instant in reference to the mangrove extract consigned to us by the Director of the Public Gardens and Plantations, Jamaica, we beg to say that in our opinion the demand, if any, would be very limited for the article. We have submitted it to tanners and others in the trade, but we cannot induce them to try it, all other tanning materials and well-known extracts being so plentiful and never cheaper.

We have sent down a sample drum to the works of the Right Hon. W. L. Jackson, Leeds, and he has promised to test it and give us a report on it. As soon as we receive this we will send you a copy.

We may mention that we have had about 1,000 bales of mangrove bark from Jamaica placed in our hands for sale, but so far we have not been able to find a buyer.

Yours, &c.
(Signed) DALTON AND YOUNG.

D. Morris, Esq., F.L.S.,
Royal Gardens, Kew.

ROYAL GARDENS, KEW, to COLONIAL OFFICE.

SIR, Royal Gardens, Kew, 9th August 1892.

I AM desired by Mr. Thiselton-Dyer to inform you that in November 1890 there was sent to Kew, by Mr. Fawcett, Director of

Public Gardens and Plantations, Jamaica, a sample of the concentrated juice of the mangrove (*Rhizophora*) bark for tanning purposes.

2. Mr. Thiselton-Dyer interested several persons in this subject and obtained from the Right Hon. W. L. Jackson, M.P., a promise to try the extract in case a sufficient quantity was prepared to be worked on a moderately large scale.

3. The further quantity desired was forwarded by Mr. Fawcett to Messrs. Dalton and Young in April last and it is now in this country. I enclose herewith an interim report from Messrs. Dalton and Young. This report is not of an encouraging character, as the supply of good tanning materials just now is large and the prices consequently very low.

4. In the latter part of their report Messrs. Dalton and Young state that they have had a large quantity (about one thousand bales) of crude mangrove bark from Jamaica placed in their hands, and they have been unable to find a buyer for it. Under these circumstances Mr. Thiselton-Dyer would suggest that a copy of Messrs. Dalton and Young's letter be communicated to the Government of Jamaica in order to inform those interested in the subject that it is undesirable at present to make any further [trial] shipments of tanning substances to this country.

I am, &c.

Edward Wingfield, Esq., C.B., Colonial Office, S.W. (Signed) D. Morris.

Colonial Office to Royal Gardens, Kew.

Colonial Office, Downing Street, 16th August 1892.

Sir,

In reply to your letter of the 9th of August, I am directed by Lord Knutsford to acquaint you that a copy of it will be sent to the Governor of Jamaica with a suggestion that he should issue a public notice that it is undesirable at present to make any further shipments of tanning substances to this country.

I am, &c.

(Signed) Edward Wingfield

The Director, Royal Gardens, Kew.

Superintendent, Royal Botanic Gardens, Trinidad, to Royal Gardens, Kew.

Trinidad Royal Botanic Gardens, 10th August 1892.

Dear Sir,

Some time since we received a suggestion from London that we might extract "cutch" from mangrove bark. I have to-day sent you a sample which has been prepared in the Gardens under my supervision, and would be glad if you would kindly ascertain through any of your correspondents in the city whether it would have any market value.

I am, &c.

(Signed) J. H. Hart, Superintendent.

The Director, Royal Gardens, Kew.

29, Mincing Lane, London, E.C., 21st September 1892.

Dear Sir,

We have delayed replying to your letter of the 14th ultimo, as we have been hoping to induce some people to try the mangrove extract, but, we regret to say, without success.

On the other side, we hand you copy of letter received from the Right Honourable W. L. Jackson. You will see that he confirms what we wrote to you on 6th August. Just now all kinds of tanning materials are so plentiful and cheap that we cannot induce anyone to trouble to experiment with an unknown article, and of which the supply would be very uncertain. We cannot even sell the mangrove bark to which we previously referred.

We have forwarded a sample to you by Carter, Paterson, and Co., and very much regret that we cannot give you a more favourable report.

We are, &c.

D. Morris, Esq., F.L.S., Royal Gardens, Kew. (Signed) DALTON AND YOUNG.

EXTRACT from letter received from the Right Hon. W. L. JACKSON.

"I have examined the mangrove bark extract, and I regret that I am not able to report very favourably upon it. Gambier at present is much cheaper as a tanner, and I do not think buyers could be found who would pay a proportionate price for this extract.

"I am afraid you will have to tell the consignors that it has come upon the market at a most unfavourable time, and there is no chance its competing with gambier at present prices."

CCLXIX.—FOOD GRAINS OF INDIA—(*continued*).

BLACK BURMESE RICE.

In continuation of previous articles contributed by Professor A. H. Church, F.R.S., on the Food Grains of India,* the following interesting analysis has been made of a black Burmese rice forwarded to Kew, through Dr. Prain, by Dr. King, F.R.S., C.I.E., of the Royal Botanical Gardens, Calcutta.

A rather full notice of this rice, obtained originally from Mr. W. S. E. Landale, has lately appeared in the proceedings of the Agri-Horticultural Society of India, 1892, p. ccxlvi. :—"A sample each of black " and white *Béni* rice was exhibited at the meeting, presented by Mr. " W. S. E. Landale, who furnished the following information :—' The " ' black Burmese *Jooma Choul* is grown by *Mughs* in Chittagong and " ' the Hill Tracts, in the *Jhooms*, or newly cleared jungle land. This " ' paddy is sown in April and cut in October, and is much more " ' glutinous and nutritious than ordinary rice, or than the black *Béni* " ' of the Bengalies, also grown in Chittagong.' "

"Mr. Landale described this rice as getting quite glutinous when cooked, and mentioned that for this reason it is frequently steamed instead of being boiled in the ordinary manner. Besides being used as a food in the regular way, it is made into a sort of pudding, flavoured with scraped cocoanut. The rice becomes quite purple when cooked. Of the white rice, Mr. Landale said, this is also a *Béni* rice, this name being used for the glutinous kinds. It has the same characteristics as the black rice, and is grown by the same people and in the same manner, both requiring but little water and thus being varieties of Hill

* *Kew Bulletin*, 1887, December, p. 7; 1888, p. 266; and 1889, p. 283.

rice. *Béni* rice is considered very nourishing and also satisfying, and for some reason is often mixed with other kinds and not eaten by itself.

"There seems to be very little recorded regarding this rice, although a sample of each from Kyouk Phoo was presented to the Society over 60 years ago by Captain Warden, who wrote: *Black rice.*—The black rice is not procurable in any large quantities on the Arracan coasts; but is, I hear, more plentiful on the Martaban coast at Moulmein, Rangoon, &c., and is only used for sweetmeats, as I understand. *Béni Choul.*—This rice is not procurable in any quantities, and is merely used by the natives in their sweetmeats. It is capital for puddings, &c.

"Dr. Watt, in his lengthy article on rice in '*The Dictionary of the Economic Products of India*' makes three short allusions to the glutinous rice. He mentions it is known in China under the name of *No*, that the botanical divisions which have been adopted do not distinguish the scented and the glutinous rices from ordinary varieties. He adds: 'The peculiar glutinous rice of Burma has been well known 'for many years. In an early part of this article reference has been 'made to Rheede's botanical account of it under the name of *Oryza* '*glutinosa*. Ainslie speaks of it as never used as bread, but com-'monly prepared as sweetmeat. There would seem, however, little or 'nothing to justify its botanical separation from many of the other 'forms of *O. sativa*; but it is noteworthy, in concluding these remarks, 'that it is not only recognised commercially, but by some writers as 'botanically distinct from the ordinary rices of Bengal.' . . . It will be seen that so far as the records on the subject go, the glutinous rice has been supposed not to be used as an ordinary food; but Mr. Landale, whose attention has been drawn to this, states from his personal knowledge, that this rice is a very popular food in Chittagong, and, in addition, it is used for making both rice beer and spirit, the latter a very potent article."

Professor CHURCH to ROYAL GARDENS, KEW.

Shelsley, Kew Gardens,
2nd August 1892.

MY DEAR MORRIS,

THE analysis of Burmese rice is completed. The results amply confirm the opinion entertained of its high dietetic value. I will send you the formal report in a day or two, but I may at once say that in flesh-forming substance, in oil, and in mineral matter this black rice shows a marked superiority over all samples of other varieties hitherto examined.

Yours, &c.
(Signed) A. H. CHURCH.

The sample of Burmese black rice submitted to analysis had been imperfectly "cleaned," no inconsiderable portion of the innermost layer of the dark integument remaining upon many of the grains. This layer contains the colouring matter which gives the dark appearance so characteristic of this kind of rice. This pigment proved to be identical with that to which the red colour of grapes, black currants, the florets of the crimson dahlia, the leaves of the copper beech, and of *Coleus Verschaffeltii*, and a great many other leaves, flowers, and fruits is due. It has been called by various names, such as oenolin, erythrophyll, colein, and anthocyan, and is represented by the chemical formula

$C_{20}H_{20}O_{10}$. When a few grains of black rice are covered with slightly acidulated spirits of wine, the pigment dissolves with a magnificent crimson colour.

One hundred grains of this sample of rice weighed 43 grains.

Composition (in 100 parts).

—	Burmese Black Rice.	Other Indian Rices (average).
Water	13·2	12·8
Albuminoids	9·2	7·3
Starch, with some sugar and gum	74·1	78·3
Oil	2·2	0·6
Fibre	0·6	0·4
Ash	0·7	0·6
Nutrient ratio	1 : 8·6	1 : 10·8
Nutrient value	88·4	86·5

The most noticeable peculiarity of this rice is its unusual richness in albuminoids and in oil. Some of the most highly esteemed of the Japanese glutinous rices have indeed been found to contain from 1½ to 2 per cent. of oil, instead of the 0·4 or 0·5 per cent. commonly present in Carolina rice, but then they are comparatively poor in albuminoids. In the sample now under discussion it was found that the coagulable albuminoids, as determined by the phenol method, amounted to 8·5 per cent., a figure which is only 0·7 per cent. lower than the proportion recorded in the above analysis, and which still compares favourably with the average, namely, 7·3 per cent., present in other Indian rices. And it must be remembered that a similar reduction (say 0·6 per cent.) must be made in the latter figure, in order that a fair comparison between the two per-centages may be made. The numbers will then be—

True albuminoids in 100 parts of—

Black Burmese rice	8·5
Other Indian rices	6·7

One of the results of this richness in albuminoids is brought out on calculating the nutrient ratio of this Burmese rice, which is much nearer to that of a complete food than is the case with the common kinds of Indian rice. These latter are likewise rather poorer in phosphoric acid than the Burmese variety.

It is satisfactory to find that chemical analysis amply confirms the high dietetic value assigned to black rice by native opinion.

It should be mentioned that *all* the above statements relate to samples of *cleaned* rice.

A. H. C.

CCLXX.—MAURITIUS TEA.

(*Camellia theifera*, Griff.)

In the *Kew Bulletin* for 1888, p. 86, an account is given of the tea cultivation in course of being established or extended in Natal, Jamaica,

and Madagascar. In the *Kew Bulletin* for February 1887, p. 7, there are discussed the prospects of starting a tea industry in Mauritius. It was pointed out that there were already in that island about 25,000 tea plants, "and these should afford a ready means of testing the capabilities "of the soil and climate for a tea industry as well as the probable cost "of production."

We have now the pleasure of recording the fact that tea of very good quality has been grown in Mauritius, and a total weight of 865 pounds has been manufactured since January last. This, it is true, is only a small beginning, but if the island produced only sufficient tea for its own consumption it could very well support one or two small estates on hilly land in the interior, not required for other cultivation.

The following remarks on tea were written by Mr. John Horne, F.L.S., late Director of Gardens and Forests in a Report on the Agricultural Resources of Mauritius, published in 1886:—

"The tea shrub grows well in the higher lying parts of Mauritius. So far as the climate is concerned the growth of this shrub in most parts of the island that are situated at an elevation of more than 800 feet above the level of the sea is proved beyond a doubt. It has long since been introduced and planted at several places; but what has to be proved is the quality of the tea which the Mauritian grown leaf will produce. Then, whether the yield will be sufficient to give a profit on the expense of cultivating the shrub, picking its leaves, preparing them into tea, as well as other expenses incident to the cultivation of the shrub and the preparation of the leaves for the market, in such a condition as to compete favourably with teas from Ceylon, India, China, Java, &c.

"There is at present growing in the borders, &c. of the nursery gardens at Curepipe, a number of plants that would yield a sufficient quantity of leaves to test their quality when prepared into tea. So far then that test could be applied at once. The wants are appliances to cure the leaf, and a tea maker or curer. If these problems are satisfactorily solved there is not the least doubt that tea will take a place, perhaps of no small importance, among the products of the colony. The following is an extract from Report of the Botanic Gardens for 1882, viz.:—

"'A subject to which it is desirable to draw the attention of owners of land in the elevated parts of the country is the cultivation of tea. This shrub thrives admirably on the heights, and its cultivation if taken up in a systematic manner would be remunerative. In the year under review a supply of tea leaves for a trial to make tea was given to Mr. D. Picton Davis, land surveyor, who had considerable experience in the cultivation and making of tea in India. With no other appliances than a common pot, in which to dry the leaves, he made a passable tea. The sample which he gave me was tried by myself and several friends. Its fault was newness, and the tea tasted a little musty, from being imperfectly dried; still it was sufficient to show what could be done, with proper appliances and management. Large numbers of Indians are purchasing lands at some elevated portion of the island. Sugar-cane or maize they may not be able to cultivate profitably but the tea-shrub would grow well in these places; and a central tea curing establishment, would indeed be beneficial to this industry. The intelligent and practical manager of the Vacoa Sugar Estates Company, Mr. J. W. Shand-Hervey, promised to give the cultivation of the tea shrub and tea making a trial, on such a scale, that sound practical result favourable or not favourable might be obtained. However, Mr. Shand-Hervey has recently left for England, and this matter has been postponed, but not for ever, it is to be hoped.'

"The value of tea imported during 1884 was Rs. 34,502. The value of the quantity exported in the same year was Rs. 1,804. The value of the quantity consumed in the Colony was Rs. 32,698 for that year. The supplies came principally from England, India, Ceylon, Hong Kong, and Singapore. Several parties are now beginning to take an interest in tea cultivation, and it is to be hoped their endeavours will be crowned by success."

The next step in the establishment of a tea industry in Mauritius appears to have been taken by Sir John Pope Hennessy in 1886. In a letter addressed to the Secretary of State he gives the following particulars of the measures undertaken by him to secure supplies of seed and a competent person to start the curing of tea:—

SIR J. P. HENNESSY to EARL GRANVILLE.

Government House, Mauritius,
MY LORD, 3rd August 1886.

I HAVE the honour to report that the number of tea plants now growing in Mauritius amounts to about 25,000.

2. I enclose for your Lordship's information copies of letters I have addressed to the Governor of Madras and the Lieutenant Governor of Bengal, asking them to assist me in getting various seeds required for the various experimental plantations, and also to engage the services for this Government of two men well accustomed to the cultivation and curing of tea, and a man conversant with the curing of tobacco.

I have, &c.
(Signed) J. POPE HENNESSY.

The Right Hon. Earl Granville, K.G.,
&c. &c. &c

An article on the cultivation of tea in Mauritius was published in the *Revue Agricole*, a local agricultural paper, for April 1887. Following this there appears to have been established a small plantation in the Government Experimental Farm at Curepipe, and a man with Ceylon experience in tea cultivation and curing was placed in charge of it. The more recent results are given in the following correspondence:—

SIR, Downing Street, 9th September 1892.

I AM directed by the Secretary of State for the Colonies to transmit to you for your information the accompanying copy of a despatch from the Acting Governor of Mauritius, enclosing reports upon the experimental tea industry of Mauritius.

I am, &c.
The Director, Royal Gardens, Kew. (Signed) R. H. MEADE.

Government House, Mauritius,
MY LORD, 8th August 1892.

I HAVE the honour to transmit, for your Lordship's information a copy of a letter which I have received from Mr. Regnard, chairman of the Experimental Plantations Committee, enclosing a report from Mr. Corson relative to the experiment which is being made in tea planting in the colony.

2. Your Lordship will observe from Mr. Corson's report that since the 1st of January 865 lbs. of tea have been manufactured, which is an encouraging result.

3. I also forward to your Lordship copy of a report and valuations made in Ceylon by Messrs. Somerville & Co. on the samples of Mauritius grown teas, which is also satisfactory.

4. The experiments in this direction, so far as they have gone, augur well for the future development of tea planting in this colony, and I will not fail to keep your Lordship informed of the progress made in extending this new industry.

5. It may interest your Lordship to know that during the recent hurricane these plantations did not suffer in the least.

I have, &c.

(Signed) H. E. H. JERNINGHAM,
Administering the Government.

The Right Hon. Lord Knutsford, G.C.M.G.,
&c. &c. &c.

THE MAURITIUS GOVERNMENT EXPERIMENTAL GARDEN.

DEAR SIR, Colombo, 5th April 1892.

HAVING examined and tasted the following teas, we now beg to hand you our report and valuations, as under, viz.:—

Nos.	Samples Mark.	Description.	London Value.	Colombo equivalent at each.	Remarks.
1	—	Orange Pekoe -	2*s.*	—	Blackish, well made very tippy broken Orange Pekoe leaf. *Liquor*, strong, dark, fine quality.
2	—	Broken Pekoe - No. 1	1*s.* 7*d.*	—	Blackish, well made and twisted Orange Pekoe leaf. *Liquor*, strong, dark, fine quality.
3	—	Broken Pekoe - No. 2	1*s.* 8*d.* 1*s.* 9*d.*	—	Blackish, well made, very tippy, leafy, broken Pekoe. *Liquor*, strong, dark, some flavour (quality fine).
4	—	Pekoe Souchong	9*s.*	—	Blackish greyish, small choppy leaf, little flakey. *Liquor*, strong, dark, good quality.

Infused leaf Nos. 1, 2, and 4:—*Not bright enough.*

Infused leaf No. 3:—Bright.

P.S.—The Orange Pekoe and broken Pekoes are very fine in appearance.

Yours faithfully,

(Signed) P. P. SOMERVILLE & Co.
D. SEALE.

REPORT ON THE GOVERNMENT EXPERIMENTAL FARM, CUREPIPE.

Tea.—The cyclone of the 29th ultimo did scarcely any damage to the tea fields. The leaves only of the large trees reserved for seed were blown about. As for the trees from which leaf is plucked they suffered still less, being much smaller, a flush or two will be lost; that is to say, there will be no plucking for the next 10 days; but after that I expect some heavy flushes, the wind having had the effect of a light pruning on the trees.

Of the young tea, now about two years old, the plants raised from cuttings suffered a little, and half a dozen plants were blown down; this is owing to the plants having no tap-roots. It would not be advisable to plant tea by cuttings.

Buildings.—A set of new lines were knocked down, and will cost Rs. 20 to put up again.

Factory.—Part of the thatched roof was carried away, and it will be necessary to remove the whole of it and replace it by an iron roof; cost about Rs. 120. At present I have repaired the damage as well as I could with thatch, &c., and as soon as carpenters can be procured at the ordinary rate I shall proceed with the work. At the same time the factory ought to be increased; it is far too small, and it is impossible to make good tea in it when there is a rush of leaf or the weather is wet. Leaf often heats, and I have to throw it away.

Tea Manufacture.—Since January 865 lbs. tea have been manufactured. Previous to that, there is in the large bin about 700 lbs. more; I cannot find the accounts.

Clearing.—I am clearing about six acres of land, and have reached the boundary (the wire lines); beyond this the Inspector of Forests at Curepipe has told me that I was not to touch.

(Signed) A. J. CORSON.

Curepipe, 6th May 1892.

CCLXXI.—POTATO DISEASE IN POONA.

The following correspondence has been received at Kew from the Secretary of State for India, on the subject of a disease in potatoes that has appeared in the Poona district, and in other localities in the Bombay Presidency. It is apparently quite distinct from the well-known potato disease induced by the attacks of a fungus (*Phytophthora infestans*). The Indian disease is in course of being investigated locally by Dr. Cunningham, F.R.S., and the results will be published later. In the meantime, Mr. George Massee, after reading the correspondence, agrees that "The disease indicated is evidently quite distinct from that "caused by *Phytophthora infestans*, but, judging from the account "given, closely resembles that caused by *Peronospora trichotoma* on "*Colocasia antiquorum* in Jamaica (*Journ. Linn. Soc.*, vol. xxiv., "p. 45." "If," he continues, "the sclerotia are formed in the substance "of the haulms, the removal of these from the ground would be as "effective, and more economical, than treating the soil as suggested."

The treatment of the soil on a large scale with a solution of copper sulphate (an ingredient in the well-known *Bouillie Bordelaise*) is likely to render it injurious to plant life, and especially as in some experiments lately undertaken in this country, there is an excess of copper salt left undecomposed in the soil. The result would vary,

according to Dr. Russell, in proportion as the salt is naturally calcareous, or purely silicious. In the latter case a deficiency of basic material would very likely bring about an excess of copper sulphate as a residue. There is also another question involved, and that is, that the use of acid copper solutions might act injuriously by destroying the nitrifying organisms in the soil.

If the plants only are treated with the copper solutions and the haulms and all rotted or diseased tubers are immediately removed from the land or burned at the time of cropping, such precautions might in themselves be sufficient to keep the disease in check. It would appear to be essential, however, that the present system of continuous cultivation of potatoes on the same land, year after year, should be discontinued. The steps taken to procure fresh supplies of good seed potatoes for planting are very important, and deserve to be encouraged in every way.

India Office to Royal Gardens, Kew.

India Office, Whitehall, S.W.,
17th September 1892.

Sir,

I am directed by the Secretary of State for India to forward herewith for your information, and publication in the *Kew Bulletin*, if considered advisable, a note by the Director of Land Records and Agriculture, Bombay, on the potato disease prevalent in the Poona district and elsewhere in that Presidency.

I am, &c.
(Signed) Horace Walpole.

The Director,
Royal Gardens, Kew

Note on the Potato Disease prevalent in the Poona District and elsewhere.

In January last year a potato disease was brought to notice affecting the crop of the Khed and Junnar Tálukas, which largely supply the Poona and Bombay markets. It has since been found elsewhere in the Poona district, in Gujarat, and at Mahábaleshvar. It seems to have made its first appearance some three or four years ago, and it now occupies the chief potato grounds of the Presidency, causing heavy loss to cultivators, and a marked deterioration of quality in the potatoes sold for consumption.

The cultivators call this the "bángdi" disease, owing to the appearance of a dark ring easily visible in the substance of the tuber on section. Unsound and (apparently) sound potatoes are found in the same field, but the whole crop is in such cases probably affected. The first outward symptom is a withering of the green top, with arrest of the growth of the tuber. The diseased crop when dug is found to be greatly undersized throughout; many tubers are rotten and putrid; others show, by a small livid spot, where putrescence is about to set in. The whole potatoes are eatable when fresh, but rot away in storage.

2. During the past season, potatoes were imported from Mahábaleshvar, Saharanpur, Bangalore, Ootacamund,* and England, and were

* The disease has made its appearance in the Neilgherries. The seed imported was of a kidney potato, which at Ootacamund had been found best to withstand infection.

distributed to cultivators as seed in the hope that the sets from hardy stocks and from a distant soil might prove sufficiently robust to resist the infection, at least for some years. Mr. Mollison, the Superintendent of Farms, gave special attention to this experiment, and also tried the effect of applying solutions of sulphate of iron and of sulphate of copper to the affected fields; both experiments have failed. The worst plots were naturally those sown with the Mahábaleshvar seed, it not being known before that the hill district was already infected. The only sound crops found were those grown in the compound of the Mamlatdar's office at Khed, and in a garden hitherto used for "pan" (Piper betel). Neither of these two grounds had been under potato for some years certainly. All the other crops exhibited the characteristic ring.

3. Concurrently with these experiments a field was sown at the Khandesh Government farm with Poona seed, which appeared to be perfectly sound. Some of the seed potatoes were kept for further examination. Khandesh is not a potato district, and the land sown had never been under potato before. The crop was diseased throughout, proving that the seed was infected, though, when sown, the signs of disease were not distinguishable by the eye. On examination of the seed potatoes which had been stored the characteristic ring and a mottled unhealthy condition of the flesh were plainly apparent. Mr. Mollison found in the diseased crop indications of a fungus which appeared to attack the green stem first.

4. At the Poona farm four varieties of English potatoes received from Messrs. Sutton and Sons were planted side by side with Poona potatoes, selected for apparent soundness, on land not before used for this crop. The English seed of all varieties produced a sound and healthy crop and has been reserved as seed for further experiment. The local potatoes were diseased, but not greatly so, and were marketable. In this experiment all the potatoes were planted in ridge-rows as in England, the irrigation water being directed along the furrows.

5. A small quantity of true seed (from inflorescence) was obtained from France, and was also tried at this farm. The object of growing from the true seed is to establish a strong and natural stock, such as in Europe is systematically resorted to when the artificial strains have shown a tendency to weakness. This experiment is being continued, but conclusions cannot be drawn at this early stage.

6. Specimens of plants in various stages of sickness have been submitted by Mr. Mollison to Dr. Cunningham, the Special Assistant to the Sanitary Commissioner with the Government of India, who has undertaken a scientific investigation of the blight. I have Dr. Cunningham's permission to quote his provisional conclusions, but it must be clearly understood that the subject is still under inquiry by him, as well as by this department, and that any opinions expressed are subject to modifications after more complete investigation. Dr. Cunningham writes: "You are quite right in distinguishing this affection from common "potato blight, for there are no signs of *Phytophthora* about the plants. "So far as I can ascertain, it is essentially due to an invasion of the "vascular bundles of the base of the haulm by fungal mycelium, which "is to be found in all the elements of the bundles, and in special "abundance in the larger vessels, which are in many places absolutely "plugged by dense sclerotial masses of filaments. With such an "invasion of the water-leading system it is of course only natural that "withering of the host should occur. The method of irrigation which "you say is employed must afford special facilities of access to the "parasite invading the submerged basis of the haulms, and the con-

"tinuous cultivation of crops from year to year in the same areas must "tend to keep up a continuous supply of the parasite, the sclerotial "masses of mycelium within the vessels being very well adapted to "survive prolonged period of dormancy, with a capacity for renewed "active growth on the recurrence of favourable conditions."

7. Mr. Mollison drew attention to the fact that the disease shows itself only on the plant approaching maturity, when the fibro-vascular bundles of the stem are well developed. At first the flesh of the tuber shows little or no sign of disturbance, but at a point about an inch below the soil-surface a brown stain makes its appearance in the substance of the haulm, and, this extending above and below, the disease rapidly declares itself. The sudden wilting of the apparently healthy green plant, often within 24 hours, is a marked and peculiar symptom. In a further communication Dr. Cunningham says:—"None of the specimens of the "blight which I have seen show any trace of spore formation, but they "do most distinctly show the formation of sclerotial masses of mycelium "within the cavities of the vessels. These are very probably the source "of propagation, as similar bodies certainly are in the case of some "other vegetable blights; and, if so, the delay in the appearance of the "disease is readily accounted for, as sclerotia frequently require a con-"siderable time to become roused from their dormant condition and "give origin to new mycelium. They in fact play the part of resting "spores, and, like them, are not always at once prepared to germinate. "The brownish tinge in the vascular bundles is in the haulm clearly "associated with the invasion of the mycelium. . . . . It is, as "you suggest, very probable that it is only in the upper layers of soil "that the sclerotia find all the conditions favouring their becoming "active. There appears to be little tendency to spread of the mycelium "downwards along the bundles of the roots, as compared to that which "it has to pass upwards along those of the haulm, and I have as yet "been unable to find any traces of it in the tubers, even where most "highly affected, as indicated by the blackening of the vascular bundles "and surrounding areas of parenchyma."

8. The scientific inquiry, Dr. Cunningham goes on to say, can only be concluded by means of experiments on infection of living plants, and these cannot be carried out before next cold weather. Meanwhile every effort must be made to discover a practical remedy for a disease which threatens to destroy one of the most valuable garden crops of the country. So far it has been shown:—

(i.) That the disease is not the European potato blight. From this it differs in the absence of the black fungous spots on the leaves and of the characteristic odour; and it differs also in not being amenable, when the crop is in the ground, to treatment by the sulphate of iron and copper solutions.

(ii.) That diagnostic symptoms may be found, before the characteristic ring of tuber is apparent, in the sudden wilting of the green top, and in the antecedent brown discoloration of the fibro vascular bundles of the haulm discoverable on section.

(iii.) That the disease germ harbours in the soil, and will infect all stocks however robust.

9. The origin of the pest is probably to be found in exhaustion of the soil and of the stock owing to over cultivation. The crop is so profitable that it is grown year after year on the same land, and the unwillingness of the cultivator to exchange it for less valuable produce, even when disease is rife, forms one of the chief difficulties to be met. A rest from potato for three or four years would probably cleanse infected land.

10. This note is published in the hope that, attention being drawn to the subject, other investigators may assist in the inquiry, so that repressive measures may be introduced without loss of time. The further experiments to be made by this department next season will be carried out mainly on the following lines, but others will doubtless suggest themselves :—

(i.) By application of the solutions of iron and copper to the field before sowing. Dr. Cunningham's researches have afforded a clue to the failure of this method when applied to the growing crop. Used in this way, it succeeds with the ordinary blight, and in the absence of microscopical investigation, it was puzzling to find that it had absolutely no effect on this disease, but, as the fungus is found to establish itself at once in the deep tissues, it is clear that external applications to the plant can be of no use. The fungal germs can, however, be attacked while harbouring in the soil, and a free treatment with the solutions ought to succeed. If in infected soil so treated, and sown with healthy seed, an untainted crop can be produced, a considerable step in advance will have been made.

(ii.) By improved cultivation. The method adopted at the Poona, farm, of growing the potatoes on ridges as in Europe, promises to afford considerable protection. There is little doubt that a saturated surface soil is favourable to the disease, and this it gets in perfection by the native method of growing potatoes on the flat. Mr. Mollison placed his ridges about 24 feet apart, with a foot between sets, and the irrigation water being run in the furrows, the soil was kept continuously moist, without ever being in the condition of a quagmire, as under the native system of flooding. The potatoes so grown were of fine quality and flavour, and free from the waxiness common to the Indian grown tuber. This, and the fact that none of the Indian potatoes produce seed-plums, looks as if a faulty method of cultivation may have caused degeneration and consequent susceptibility to disease in all the acclimatised stocks. The ridge system, in any case, deserves to be fully tried.

11. I append a few instructions as to the solutions referred to in the preceding paragraph.

(Signed) E. L CAPPEL,
Director, Land Records and
Agriculture, Bombay.

Poona, 11th June 1892.

Copper sulphate solution with quicklime ("Bouillie Bordelaise") for 1 acre :—

45 lbs. sulphate of copper.
22½ lbs. quicklime.
220 gallons of water (2,200 lbs.).

The sulphate should be dissolved by hanging it in a coarse cloth or basket in water contained in a wooden vessel. Hot water acts more quickly. The quicklime is slaked in a separate tank and then stirred into a fine gruel with added water. This should be passed through a sieve into the solution, well stirred, and the remaining water added.

Iron solution with quicklime is made in the same proportions, substituting the iron for the copper salt. It is much cheaper, but its value

has not been definitely proved. The "Bouillie Bordelaise" was proved to be specific for the European blight by an exhaustive series of experiments in England and on the Continent, and the recipe is given as published by the Royal Agricultural Society. As the quantities were intended for spray application to the plant surface, probably more will be required for the disinfection of the soil, and a double quantity of the copper solution might be tried; in the case of the iron solution even more may probably be applied without danger to the crop.

CCLXXII.—BRITISH NORTH BORNEO.

The following account of the progress of planting industries in this territory is taken from Mr. Consular Agent Pryer's Report, published by the Foreign Office [1892, Annual Series, No. 1,111].

"To turn to other planting operations. There is now hope that the real capabilities of the country will at last receive some attention. A coffee company started in London in the early part of the year has commenced work in Malluda Bay, and another company also started in London is testing the capabilities of the soil and climate in the neighbourhood of Sandakan for the cultivation of sugar-cane, Manila hemp, Liberian coffee, india-rubber creeper, cotton, and other things."

"Manilà hemp is the fibre of the stem of a sort of banana, *Musa textilis*, which hitherto has been grown only in the Philippine Islands, where it is a source of great wealth to the growers, the Government, and all concerned, and is the means of affording freight to a large number of vessels. The soil and climate of North Borneo have also been proved, owing to a series of experiments conducted during several years past, to be particularly favourable to the proper growth of the plant; satisfactory samples have been sent home, and the cultivation is now being considerably extended. Owing to the heavy taxes, &c. in the Philippines, it is claimed that North Borneo can put its hemp on board the export ship at a lower price than the Philippines can, and the first steps of North Borneo to rival the Phillipines in this production are being watched with much interest, as once started this industry may become of very large proportions in the future."

"Gambier, another thing whose growth also is entirely confined to this part of the world, is now being tried, the Government having started a small experimental garden at the back of Sandakan; the plants at the end of the year were four months old and as large as those in the Straits Settlements at six months. This promise continues at the time of writing, and the Chinese in charge say they will be able to commence boiling two or three months earlier than in Singapore."

At the present time Gambier is almost exclusively a monopoly of the Straits Settlements. An account of its production is given in the *Kew Bulletin* for 1889, pp. 247–53. The following further information as to the progress of this staple in continuation of that given in the *Kew Bulletin*, 1892, p. 76, is taken from the *British North Borneo Herald* for July 1, 1892:—

"The Government gambier garden beyond Mengkaleenow is coming on very well. Boiling could be commenced at once, two or three months sooner from the time of planting (last September) than it is usually attempted in Singapore; but as the number of plants is so few it is thought better to wait for a month or two more."

CCLXXIII.—ALLOÚYA TUBERS.

(*Calathea Allouya*, Lindl.)

In March 1891 there were received from Mr. J. H. Hart, F.L.S., Superintendent of the Royal Botanic Gardens, Trinidad, tubers of a *Scitamineæ*, which were known in the island as "Topee Tamboo" and used as an article of food. "The small tubers are the edible parts. "They are boiled and eaten like the ordinary potato, with butter and "salt. They have an agreeable nutty flavour and are much liked." In the absence of leaves and flowers these tubers were supposed at first to belong to some species of *Kæmpferia*. The tubers of *Kæmpferia rotunda* are of an oblong shape and nearly an inch in diameter, but they have a hot ginger-like taste which would prevent their general use as a substitute for potatoes. Similar tubers were also known at Dominica, according to Dr. H. A. A. Nicholls, F.L.S., under the name of "Tokkee Tambo" These local names it was noticed were evidently only a corruption of *Topinambour*, the French for the Jerusalem Artichoke *Helianthus tuberosus*. It was therefore impossible to trace the history of the plant from them. Quite recently Mr. Hart was enabled to forward to Kew good specimens of leaves and flowers and no difficulty was then experienced in identifying the plant with a well-known West Indian species of *Scitamineæ* that had yielded food in Carib times. It was known to the Carib people as Allouya, and the aboriginal appellation has been retained in the scientific name now borne by the plant.—

Calathea Allouya, Lindl. Griseb. *Flora Brit. West India Islands* (1864), p. 604. The root usually consists of a large ovate bulb, and to this several globose or ovate stalked tubers of various sizes are loosely attached by strong fibres. The smaller tubers are the parts usually eaten. The leaves are of a pale green colour, somewhat papery in texture, and placed on long petioles. They are ovate lanceolate, inæquilateral and strongly nerved. The scape or flowering stalk issues from the sheath of a floral leaf near the base; it is much shorter than the leaves, simple, and bears a capitate spike of flowers. The green imbricated bracts have a pale membranaceous margin. The flowers are pure white, and are followed by a three-celled capsule with three seeds.

One of the earliest accounts of this interesting plant is given in Plumier's Manuscript, vol. v. tab. 35, where it is described as "Alloya "foliis cannacori radicibus tuberosis."

Aublet in *Hist. Pl. Guian.* Fr., Vol. 1, p. 3, refers to it as *Maranta Allouya*, "des racines sont garnies de tubercules plus on moins gros "qui sont bons à manger cuits sous la cendré." He describes minutely the locality in French Guiana where the plants were found by him —"On trouve cette plante dans une forêt marécageuse qu'on tra- "verse en allant de l'habitation de Madame de Gourgue à l'abattis "du Roi."

Descourtilz figures the plant in *Flore Medicale des Antilles*, t. 26. He calls it a Curcuma with tuberous roots, and states the latter possess stomachic and anti-scorbutic properties. In his account of the plant and in the references he makes to Tussac and Labat he has evidently confounded it with the arrow-root plant (*Maranta arundinacea*). There is an excellent figure with description in Roscoe's *Monandrian Plants*, tab. 38, under the name of *Phrynium Allouya*. The figure was taken from a plant that had flowered in the Botanic Gardens at Liverpool. "This had been brought from the island of St. Vincent by "Mr. C. C. Parker, who found it flowering there in August 1824 at a "place called Belair."

It is evident that the plant has a fairly wide distribution in tropical America. It is found, according to specimens, in the Kew Herbarium, in Porto Rico (*Sintenis*), Dominica (*Imray*), Martinique (*Hahn*), and St. Vincent (*Anderson*). It is also known in San Domingo and Hayti, and extends southwards to Trinidad and Guiana: It does not appear to have been found hitherto either in Jamaica or Cuba.

When the tubers were received from Trinidad in 1891 they were brought before the scientific committee of the Royal Horticultural Society, and the following record appears in the *Journal* of the Society, vol. xiii., p. lix. :—" Mr. Morris exhibited specimens of tuberous roots " [supposed to be] produced by a species of *Kæmpferia* at Trinidad, and " used as food under the name of 'Toppee Tambo.' Mr. J. H. Hart, " F.L.S., the sender of the specimens, stated that the small tubers are " preferred, and these are boiled and eaten like a potato with salt and " butter. They have an agreeable nutty flavour, and are much liked " by the people. Similar tuberous roots are used at Dominica under " the name of 'Tokkee Tambo.' Mr. Morris added that this was an " interesting record of the use of the tubers of a Scitamineous plant for " purposes of food, and he suggested that they might be chemically " investigated. Professor Church was good enough to undertake an " examination of the specimens and report the results at a subsequent " meeting."

In the same *Journal*, p. cix., it is further stated " Professor Church " had examined the tuberous roots exhibited at a previous meeting by " Mr. Morris, which are used as food in Trinidad and Dominica. He " found that they contained very little starch, but a relatively large " amount of gummy matter, which possessed a strong left-handed rota- " tion, being apparently one of the lævulose group. He remarked that " it rapidly absorbed iodine, which became quite colourless, so that it " was difficult to detect the starch unless a considerable quantity of " iodine was present. These roots, therefore, would seem to have a " composition closely resembling the tubers of *Stachys tuberifera*," [a new vegetable lately introduced into this country].

CCLXXIV.—MISCELLANEOUS NOTES.

Mr. J. Burtt Davy, Office Assistant, has resigned his appointment in the Royal Gardens, owing to ill-health.

Dr. H. Dukinfield Scott, F.L.S., late Assistant Professor of Botany at the Royal College of Science and Royal School of Mines, South Kensington, has been appointed Honorary Keeper of the Jodrell Laboratory at the Royal Gardens. This laboratory was built in 1876 through the munificence of T. J. Phillips Jodrell, Esquire, M.A., for the purpose of investigations on the material afforded by the living collections maintained in the Royal Gardens.

Numerous distinguished workers have used it during the last 16 years, and their researches have proved of great interest and importance. They have been printed in the publications of the Royal Society and elsewhere. The occupation of the Jodrell Laboratory has, however, not been continuous, and it has long been felt that the development of its utility would require the constant supervision of a permanent official so as to bring its work and administration into line with that of other branches of the establishment. Under Dr. Scott's charge, admission will be granted, as in the case of the Herbarium, to persons qualified to conduct original researches independently on material provided by the living collections. It will be no part of the Keeper's duty to give instruction to beginners or to afford advice and assistance to inexperienced workers. His aid in making use of the resources of the laboratory will be, however, always at the disposal of those who by previous training are capable of employing them to useful purpose.

The collection of HARDY HERBACEOUS PLANTS at Kew, an exceptionally rich one, is accommodated mainly in the formal beds in the Herbaceous Ground and in the Rockery, where collective interest rather than effect is aimed at. Many of the larger and showier species however require a bolder arrangement and more space than would be afforded in the Herbaceous Ground, and to provide this a large border, previously planted with mixed shrubs, was cleared, trenched, heavily manured, and planted in the spring with large flowered herbaceous perennials and annuals. The border, which is on the west side of the T. Range, is 350 feet long and 20 feet wide, and from the end of June till the end of September it has been a great attraction to visitors. The plants grown in it are perennial Sunflowers, Dahlias, Phloxes, Hollyhocks, Gladioli, Sweet Peas, Rudbeckias, Asters, Pentstemons, Stocks, Poppies, Pœonies, Foxgloves, and a large selection of other plants. Each kind is represented by a large bold mass. A few ornamental flowering shrubs such as Roses, Spiræas, Genistas, and also a few evergreens for winter effect are mixed with the herbaceous plants.

ARISTOLOCHIA GIGAS var. STURTEVANTII. This plant has bloomed freely in several of the tropical houses, particularly in the Water Lily House, where its large remarkable flowers hang very effectively from the roof. Kew obtained the plant originally from Mr. E. D. Sturtevant, New Jersey, who procured it from Guatemala in 1888. Its flowers are about 18 inches wide, 22 inches long, with a tail 42 inches long, their colour being creamy yellow and deep maroon purple. The adoption of Lindley's name *A. Gigas* for the type was explained by Mr. W. B. Hemsley, F.R.S., in the *Gardeners' Chronicle*, 1891, p. 552, where a figure of the variety is also given, and *Garden and Forest*, 1891, iv., p. 546.

STEVENSONIA GRANDIFOLIA. A large specimen, probably the largest in Europe of this rare palm, and which has long been a feature in the Palm House at Kew, is now flowering for the first time. It is a native of the Seychelles, where it was discovered by Duncan, who sent three small plants of it to Kew in 1855, one of which was soon afterwards

stolen. Probably the specimen now flowering is one of the other two, although in J. Smith's Kew Records it is stated that "four months after "my retirement, in May 1864, I learned that these two rare palms were "dead." The genus is monotypic and endemic in the Seychelles, where it grows to a height of 40 to 50 feet. The Kew specimen is 30 feet high, and has a slender spineless stem. The leaves are cuneate, obovate, bifid, laciniated, 7 feet long and 5 feet wide, green, spotted with rusty red. The inflorescence is an erect branched panicle 3 feet long, clothed with yellow flowers. A figure of the plant has been prepared for publication in the *Botanical Magazine.*

Bromelia fastuosa, Lindl. This species was described and well figured by Lindley in his Collectanea in 1821 from a plant flowered by Aylmer B. Lambert, Esq., at Boyton, Wilts. The same species was named *B. antiacantha* by Bertoloni, *B. Sceptrum* by Fenzl, and *B. commeliana* by De Vriese. It is now widely spread in cultivation, and may be recognised by its bright-red, sword-shaped inner leaves, lax panicle, and especially by its petals, which are more protruded beyond the calyx-segments than in any other species. All the known species of this genus (about nine in number) resemble one another closely in the leaves. We have flowered at Kew this year this plant, as also a plant which we have had since 1872, under the name of *Hechtia longifolia,* (*see* Baker's Handbook of Bromeliaceæ, page 140). This latter proves to be a form of this same species.

The fine collection of Australian timbers in Museum No. 3 has recently been enriched by the receipt from the Technological Museum, Sydney, of a series of twenty-one specimens. These have all been authentically named in Australia from botanical specimens gathered from the actual trees themselves. The care thus exercised in obtaining their correct names makes them extremely valuable. It is too well known that the exhibits brought together at International Exhibitions have often been far from correctly named, the sections being often hurriedly cut, and the numbers, it may be, lost by the constant shifting of position, damp, or other causes. In consequence, many fine and otherwise valuable collections of woods have become quite worthless. It is with the view of making the Kew Collection absolutely trustworthy in regard to scientific nomenclature that Mr. J. H. Maiden, F.L.S., of the Sydney Technological Museum, has kindly undertaken to send from time to time samples of the woods of that colony whose identification can be relied upon. These will take the place of other specimens in the Timber Museum whose determination from one cause or other is open to doubt.

Amongst the numerous Oil Seeds that are constantly being received at Kew, for the purpose of naming, from Liverpool brokers and seed crushers were some that made their first appearance at Liverpool from the West Coast of Africa in February 1891. They appear to have

attracted a considerable amount of attention, judging from the fact that they were received at Kew from several different brokers about the same time, and a month later, in March 1891, samples were also received from Germany. Quite recently the same seeds have again appeared, having been sent to Kew by a seed-crushing firm at East Greenwich. The interest attached to them from a commercial point of view is probably due to the quantity of oil their kernels seem to contain, rather than to its quality or properties, for up to the present these appear not to have been tested, they may, however, become an important source both of oil and oil-cake, for though nothing definitely is known as to the plant producing them, inasmuch as no other material than the fruits themselves, without the fleshy coverings, have been received at Kew, it is clear from these alone that the plant belongs to the natural order *Olacineæ*, and probably to the genus *Heisteria*. The fruits as received are hard and woody, requiring some force to break them; they are ovate in form, about 1 inch long, and ¾ inch in diameter, of a dull earthy brown colour, marked by irregular longitudinal striations, the inside being filled with a whitish, fleshy, and very oleaginous kernel. From the fact that the plants constituting this order are free from any poisonous or deleterious properties, and that the fruits of some of the species are edible, it may be inferred that this new oil seed may prove of some commercial value. No locality has been given whence the seeds have been obtained, the only information on that head being, as before stated, that they were imported from the West Coast of Africa.

Through Dr. Bataline, the successor of Dr. Regel in the Directorship of the Imperial Botanic Garden of St. Petersburgh, Kew has received a further consignment of dried PLANTS, comprising about 1,200 species. Specially valuable amongst them are many novelties collected by Russian explorers in CENTRAL ASIA. It also includes a small collection from Hayti, whence we have very few plants in the Kew Herbarium.

Our rapidly increasing LIBRARY of scientific serials has been augmented by an almost complete set of the *Transactions of the Academy of Science of St. Louis*. It was a gift from the Academy, obtained through the kind offices of Dr. N. L. Britton of Columbia College, New York.

From Dr. G. King, Superintendent of the Royal Botanic Garden, Calcutta, we have received a valuable collection of about 100 sheets of dried specimens of PALMS, chiefly from the Malay peninsula and islands; and about 350 sheets of ANONACEÆ. The latter include types of nearly all the numerous species described by Dr. King in the fourth part of his "*Materials for a Flora of the Malay Peninsula*." Out of the 25 Indian genera of *Anonaceæ*, 20 are represented by new species, varying in number from one in nine different genera to 17 in *Polyalthia*. We are also indebted to Dr. King, who has been working at Kew this summer and autumn, for the determination of our unnamed specimens of Indian Anonaceæ and several other natural orders, on which he is just now engaged.

Mr. J. Buchanan, C.M.G., Acting Consul in NYASALAND, has presented the Kew establishment with the first set of a large collection of DRIED PLANTS made in that region in return for the approximate naming of the same. The collection contains probably at least 500 species, each represented by several specimens; but until the collection is worked out it is impossible to do more than make a very rough guess at the number of species.

The number of species of PLANTS collected by Dr. G. D. Haviland in the district of SARAWAK, BORNEO, has been increased by two further collections to about 1,000. These two sets almost surpass the first one in interest. They consist almost entirely of species not contained in the first lot, and many of them are doubtless new. Amongst the more valuable additions we may mention a *Magnolia*, a genus not previously recorded from Borneo; *Baphia*, the genus previously known only from tropical Africa and Madagascar; *Plæsiantha*, described by Sir Joseph Hooker from very imperfect material from the district of Brunei; *Gonyanera*, *Praravinia*, *Rigiolepis*, *Hexatheca*, each only previously known from a single species found either in Sumatra or in Borneo; *Gonystylus*, represented by three different species, &c. The lowland collection is particularly rich in *Anonaceæ*, *Rubiaceæ*, *Myrsineæ*, and *Euphorbiaceæ*. So far as the determinations have been carried at present, two genera seem to be quite new, one near *Torenia*, and the other near *Ardisia*.

A collection made by Dr. H. A. Haviland and Dr. G. D. Haviland on the KINI BALU is of equal interest. It consists of about 355 species of which 41 are cryptogams. Of the phanerogams about 180 were collected below 7,000 feet, 75 between 7,000 and 10,000 feet, and 70 above 10,000 feet, on the steep rocky slopes of the summit. As our knowledge of the flora of Kini Balu is limited to a few general notes by Low, Spencer St. John, and Burbidge, and a small number of species figured and described mostly by Sir Joseph Hooker in the *Transactions of the Linnean Society*, vol. xxiii., and in Hooker's *Icones Plantarum*, vol. ix., amounting altogether to 30, this collection is highly interesting and illustrates the vegetation of three distinct regions as indicated by Spencer St. John in the proceedings of the Geographical Society for 1862. The general character of the vegetation is distinctly Malayan. The prevailing orders from 2,000–7,000 feet are *Rubiaceæ*, *Melastomaceæ*, *Orchideæ*, *Myrsineæ*, and *Euphorbiaceæ*; from 7,000–10,000 feet, *Vacciniaceæ*, *Rubiaceæ*, *Myrsineæ*, *Ericaceæ*, and *Myrtaceæ*. Of the *Melastomaceæ* only two were collected as against 23 in the lower region. Here Conifers and *Quercus* first appear and Rhododendrons become numerous. Above 10,000 feet *Cyperaceæ*, *Orchideæ*, *Rosaceæ*, *Rubiaceæ*, *Vacciniaceæ*, and *Ericaceæ* predominate. *Coniferæ* are represented by *Phyllocladus hypophylla*, Hk. f., and two Podocarpi, the first reaching 12,000 feet. A dwarf oak, and probably a new genus of *Cornaceæ*, near *Alangium*, are common to this and the intermediate region. A few of the plants are identical with species found by Sir William MacGregor in the highlands of New Guinea, such as *Drimys piperita*,

Hk. f., *Potentilla leuconota*, D. Don, *Rhododendron Lowii*, Hk. f., *Drapetes ericoides*, Hk. f., and *Phyllocladus hypophylla*, Hk. f., whilst others are closely allied to species from New Guinea, or are representative of Australian types, as, for instance, a *Ranunculus*, a *Leptospermum*, a *Trachymene*, a *Coprosma*, a *Euphrasia*, and one or two grasses. Another foreign element in this highland flora is a *Photinia*, similar to *P. Delavayi* from South-west China. Apart from these few exceptions, the character of the flora, even of the highest part of Kini Balu, is also essentially Malayan.

Under the authority of the Government of Ceylon, Dr. Henry Trimen, F.R.S., Director of the Royal Botanical Gardens in that Colony, is engaged in preparing for publication a HANDBOOK TO THE FLORA OF CEYLON. The work will be illustrated by 100 coloured plates of the more interesting species. All the known species will be fully described, and much local information afforded with a view to render the book of use to residents in the island. The first part, accompanied by 25 plates, is expected to be ready by the beginning of 1893. The work will be published by Messrs. Dulau & Co., Soho Square, London.

It is a matter of regret to record that MR. JOHN HORNE, F.L.S., has been compelled, on account of ill-health, to resign the post of Director of Gardens and Forests at Mauritius. Mr. Horne has been connected with the Botanical Gardens at Mauritius for more than 30 years. He was trained at Kew, and his first appointment was as assistant gardener under the late Mr. James Duncan in 1861 ; he was appointed sub-director in 1866, and ultimately succeeded to the Directorship in 1877. Mr. Horne had charge both of the Botanical Gardens and of the Forests in Mauritius for 15 years, and he discharged the onerous duties of the dual posts with fidelity and success. The Mauritius Gardens, under his care, attained to a high degree of efficiency, and they were rendered of great service in promoting local industries in the island. Mr. Horne afforded valuable help in the production of the Flora of Mauritius and Seychelles by Mr. J. G. Baker, F.R.S. (published in 1877), and he contributed the principal supply of specimens illustrating the Flora of the Seychelles. In 1877, Mr. Horne visited Fiji (at the instance of its Government), and wrote "A year in Fiji" (published in 1881), a work dealing chiefly with the vegetable resources of the Colony.

In a letter addressed by Kew to the Colonial Office, dated the 15th March 1888, the following testimony was borne to the late Director's services:—

"Mr. Horne has most ably and industriously carried out his duties at Mauritius. The Mauritius Gardens are deservedly one of the most popular institutions in the island. They are annually visited by more than one-third of the inhabitants of Mauritius, and they have proved of signal service to the community by the introduction and distribution of new sugar-canes and other plants of a valuable character. "It is impos-
" sible to over estimate the share taken by the Botanical Gardens in

" introducing hardy and productive varieties of sugar-canes to Mauritius
" at a time when the sugar industry was imperilled by the attacks of
" destructive insects and disease. Canes to the number of 130 varieties
" ' were introduced by the gardens, propagated at them, and distributed
" ' from them, not in a cane or so of each variety, but in quantities
" ' of several thousand canes of each of the leading sorts to each planter.'
" Of late years the Gardens have rendered additional services in
" endeavouring to alleviate local depression by carrying on inquiries
" with the view of establishing minor industries. Indeed, there would
" appear to be no function attached to the Mauritius Botanic Gardens
" which Mr. Horne has not endeavoured to discharge as fully as the
" means at his disposal have allowed."

News has been received at Kew of the death from typhoid fever of Mr. G. Carstensen, Superintendent of the Victoria Municipal Gardens, Bombay. MR. CARSTENSEN was recommended for this post by Kew in 1886. He appears to have done excellent service in promoting horticultural matters in Bombay, and he has contributed several papers on gardening subjects to the *Journal of the Bombay Natural History Society*.

In a letter announcing Mr. Carstensen's death, he was described as popular and painstaking, and it was stated that he had greatly improved the garden under his charge, and he had contemplated extending the character and value of the collections so as to render them of greater scientific interest.

What little interest is being taken at present in extracting RAMIE FIBRE from *Boehmeria nivea* appears to be centred at Belfast. Numerous applications have been received at Kew for Ramie stems for experimental purposes, but owing to the unfavourable conditions of last winter the plants at Kew have yielded a poor crop of stems. It may be useful to state that investigators of Ramie in Ireland could very well obtain stems either from the Royal Botanical Gardens at Glasnevin, or from growers of the plant in the mild climate of the South of Ireland. Mr. F. W. Moore, Curator of the Glasnevin Gardens, writes that the plant is "quite hardy" with him, and he would be pleased to send specimens, as far as his resources allow, to those who apply to him for them.

A NEW VARIETY OF SUGAR-CANE is stated to have been discovered in the Upper Niger region of Central Africa. It is described as "a giant
" variety possessing great saccharine richness, and capable of being
" readily reproduced from seed which in this variety is well developed."
Several inquiries have already been addressed to Kew in regard to this cane, and it may be well to state at once that there are grounds for

believing that the plant mentioned is not a sugar-cane at all, but the ordinary guinea corn or sorghum (*Sorghum vulgare*), which is widely distributed over Africa. This plant, it is well known, yields a useful syrup, and strenuous efforts are being made in the United States at the present time to extract a granulated sugar from it. Should the Niger plant prove to possess any special merits as a Sorghum we shall no doubt, hear more about it. It can have, however, little or no interest to the tropical sugar planter.

ROYAL GARDENS,

KEW.

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